

WHAT IS CLAIMED IS:

1. A system for the protection of cargo comprising:
a tracking device to be inserted in a cargo; said tracking device including a communication module and a dead reckoning module; said communication module being configured to communicate with a central server;
and
an access point including a GPS receiver and a communication module configured to communicate with said tracking device communication module; said access point being so configured as to periodically supply GPS position data to said tracking device;
wherein said tracking device is so configured that when the communication between the tracking module and the access point is lost, a last received GPS position data and dead reckoning data from said dead reckoning module are transmitted by the tracking module to the central server via said communication module of the tracking device.
2. The cargo protection system of claim 1, wherein said communication module of said tracking device includes a wireless LAN transceiver.
3. The cargo protection system of claim 2, wherein said communication module of said access point includes a wireless LAN transceiver configured to communicate with said wireless LAN transceiver of said tracking device; the GPS position data being transmitted from said access point to said tracking device via said respective wireless LAN transceivers.
4. The cargo protection system of claim 1, wherein said communication module of said tracking device includes a cellular transceiver enabling the tracking device to communicate with the central server.

5. The cargo protection system of claim 1, wherein said communication module of said access point includes a cellular transceiver enabling the tracking device to communicate with the central server.

6. The cargo protection system of claim 1, wherein said tracking
5 device includes a controller interconnecting said communication module and said dead reckoning module.

7. The cargo protection system of claim 6, wherein said controller includes memory to temporarily store dead reckoning data supplied by said dead reckoning module.

10 8. The cargo protection system of claim 1, wherein said access point includes a controller interconnecting said GPS receiver and said communication module.

9. The cargo protection system of claim 8, wherein said controller of said access point includes memory to temporarily store GPS position data
15 supplied by said GPS receiver.

10. The cargo protection system of claim 1, wherein said dead reckoning module of said tracking device includes at least one dead reckoning sensor selected from the group consisting of an accelerometer, a gyroscope, a magnetometer, an electrolytic tilt sensor and an electronic compass.

20 11. The cargo protection system of claim 10, wherein said accelerometer, gyroscope, electrolytic tilt sensor and electronic compass are 3D devices.

12. The cargo protection system of claim 10, wherein said dead reckoning module further includes a thermistor.

25 13. The cargo protection system of claim 1, wherein said tracking device further includes a high frequency sound generator.

14. The cargo protection system of claim 1, wherein said access point is so mounted to a trailer that a virtual fence is generated around the trailer by the range of the communication module of the access point.

15. The cargo protection system of claim 1, further including a
5 hand-held communication device that is periodically in communication with the central server.

16. The cargo protection system of claim 15, wherein, when the communication between the tracking module and the access point is lost, the notified central server communicates with said hand-held communication
10 device to determine if a false alarm exists.

17. The cargo protection system of claim 15, wherein said hand-held communication device is used to authenticate a user and allow system operations to be performed.

18. A system for the protection of cargo comprising:
15 a tracking device to be inserted in a cargo; said tracking device including a communication module and a dead reckoning module; said communication module being configured to communicate with a central server; and

20 an access point including a movement detector and a communication module configured to communicate with said tracking device communication module; said access point being so configured as to periodically communicate with said tracking device;

25 wherein said tracking device is so configured that when the communication between the tracking module and the access point is lost, dead reckoning data from said dead reckoning module are transmitted by the tracking module to the central server via said communication module of the tracking device.

19. The cargo protection system of claim 18, wherein said communication module of said tracking device includes a wireless LAN transceiver.

20. The cargo protection system of claim 19, wherein said 5 communication module of said access point includes a wireless LAN transceiver configured to communicate with said wireless LAN transceiver of said tracking device.

21. The cargo protection system of claim 18, wherein said communication module of said tracking device includes a cellular transceiver 10 enabling the tracking device to communicate with the central server.

22. The cargo protection system of claim 18, wherein said communication module of said access point includes a cellular transceiver enabling the tracking device to communicate with the central server.

23. The cargo protection system of claim 18, wherein said 15 tracking device includes a controller interconnecting said communication module and said dead reckoning module.

24. The cargo protection system of claim 23, wherein said controller includes memory to temporarily store dead reckoning data supplied by said dead reckoning module.

20 25. The cargo protection system of claim 18, wherein said access point includes a controller interconnecting said movement detector and said communication module.

25 26. The cargo protection system of claim 18, wherein said dead reckoning module of said tracking device includes at least one dead reckoning sensor selected from the group consisting of an accelerometer, a gyroscope, a magnetometer, an electrolytic tilt sensor and an electronic compass.

27. The cargo protection system of claim 26, wherein said accelerometer, gyroscope, magnetometer, electrolytic tilt sensor and electronic compass are 3D devices.

28. The cargo protection system of claim 26, wherein said dead
5 reckoning module further includes a thermistor.

29. The cargo protection system of claim 18, wherein said tracking device further includes a high frequency sound generator.

30. The cargo protection system of claim 18, wherein said access point is so mounted to a building that a virtual fence is generated
10 around the building by the range of the communication module of the access point.

31. The cargo protection system of claim 30, wherein a virtual fence is defined by the outer limit of overlapping ranges of the communication modules of more than one access points.

15 32. The cargo protection system of claim 18, wherein said movement detector is selected from the group consisting of an accelerometer, a gyroscope, a tilt sensor and a GPS receiver.

20 33. The cargo protection system of claim 18, further including a hand-held communication device that is periodically in communication with the central server.

34. The cargo protection system of claim 19, wherein, when the communication between the tracking module and the access point is lost, the notified central server communicates with said hand-held communication device to determine if a false alarm exists.

25 35. A system for the protection of cargo comprising:

cargo tracking means including communication means and dead reckoning means; said communication means being configured to communicate with a central server; and

means for creating a virtual fence around the cargo; said virtual

5 fence creating means including means for receiving GPS position data and communication means configured to communicate with said communication means of said cargo tracking means; said virtual fence creating means being so configured as to periodically supply GPS position data to said cargo tracking means;

10 wherein when the communication between the cargo tracking means and the virtual fence creating means is lost, a last received GPS position data and dead reckoning data from said dead reckoning means are transmitted to the central server via said cargo tracking means communication means.

15 36. A method for the protection of cargo comprising the acts of:
providing a cargo tracking device to a cargo; the cargo tracking device including a communication module and a dead reckoning module;
creating a virtual fence around the cargo;
providing GPS position data to the cargo tracking device while the

20 cargo is within the virtual fence;
when the cargo exits the virtual fence:
obtaining dead reckoning data from the dead reckoning module;
transmitting a last received GPS position data to a central server via the communication module of the cargo tracking device; and

25 transmitting dead reckoning data to a central server via the communication module of the cargo tracking device.

37. The cargo protection method of claim 36, wherein said virtual fence creating act includes providing an access point having a communication module having a communication range defining a virtual fence.

38. The cargo protection method of claim 36, wherein said virtual fence creating act includes providing at least two access points having respective communication modules having respective communication ranges; said virtual fence being defined by the outer limit of overlapping ranges of the
5 communication modules.

39. The cargo protection method of claim 36, further comprising the analysis by the central sever of the last received GPS position data and the dead reckoning data to determine the current position of the cargo.

40. The cargo protection method of claim 36, wherein said last
10 received GPS position data transmission act includes establishing a cellular communication between the tracking device and the central server.

41. The cargo protection method of claim 36, wherein said dead reckoning data transmission act includes establishing a cellular communication between the tracking device and the central server.

15 42. The cargo protection method of claim 36 further comprising the act of transmitting an alarm from the tracking device to the central server when the cargo tracking device exits the virtual fence.